PENDING CLAIMS

AMAT Reference No.: 3843D1

F&R Reference No.: 05542-378002

Serial No.: Unassigned Filed:

Entitled: CHEMICAL MECHANICAL POLISHING WITH FRICTION-BASED CONTROL

---

1. A method of chemical mechanical polishing, comprising:
pressing a substrate against a polishing surface with a controllable pressure;
creating relative motion between the polishing surface and the substrate at a velocity; and
controlling at least one of the pressure and velocity in response to a signal that depends on the friction between the substrate and the polishing surface to maintain a constant torque, frictional force, or coefficient of friction.

2. The method of claim 1, wherein the controlling step includes varying the pressure to maintain a constant torque.

3. The method of claim 1, wherein the controlling step includes varying the pressure to maintain a constant friction.

4. The method of claim 1, wherein the controlling step includes varying the pressure to maintain a constant frictional coefficient.

5. The method of claim 1, wherein the controlling step includes varying the velocity to maintain a constant torque.

6. The method of claim 1, wherein the controlling step includes varying the velocity to maintain a constant friction.

7. The method of claim 1, wherein the controlling step includes varying the velocity to maintain a constant frictional coefficient.

8. The method of claim 1, wherein the controlling step includes varying the velocity and the pressure to maintain a constant torque.

9. The method of claim 1, wherein the controlling step includes varying the velocity and the pressure to maintain a constant friction.

10. The method of claim 1, wherein the controlling step includes varying the velocity and the pressure to maintain a constant frictional coefficient.

11. The method of claim 1, wherein the controlling step includes generating a motor signal representing a current in a motor that creates the relative motion between the polishing surface and the substrate, and deriving a carrier head pressure control signal by subtracting a threshold value from the motor signal.

12. The method of claim 11, wherein the controlling step includes amplifying or attenuating a difference between the threshold and the motor signal to determine the carrier head pressure control signal.

13. The method of claim 11, wherein the motor signal is a carrier head control signal, a platen control signal, or a motor current signal.

14. The method of claim 1, wherein the polishing surface includes a fixed abrasive polishing material.

15. The method of claim 1, wherein creating relative motion includes rotating the polishing surface.

16. The method of claim 1, wherein creating relative motion includes rotating the substrate.

17. A method of chemical mechanical polishing, comprising:
pressing a substrate against a polishing surface with a controllable pressure;
creating relative motion between the polishing surface and the substrate at a velocity; and
controlling the pressure applied by the carrier head in response to a friction between the substrate and the polishing surface to maintain a substantially constant polishing rate.

18. The method of claim 17, wherein the controlling step includes generating a motor signal representing a current in a motor that creates the relative motion between the polishing surface and the substrate, and deriving a carrier head pressure control signal by subtracting a threshold value from the motor signal.

19. The method of claim 18, wherein the controlling step includes amplifying or attenuating a difference between the threshold and the motor signal to determine the carrier head pressure control signal.

20. The method of claim 18, wherein the motor signal is a carrier head control signal, a platen control signal, or a motor current signal.

21. The method of claim 18, wherein the controlling step includes smoothing the carrier head pressure control signal.

22. The method of claim 17, wherein the polishing surface includes a fixed abrasive polishing material.

23. The method of claim 17, wherein creating relative motion includes rotating the polishing surface.

24. The method of claim 17, wherein creating relative motion includes rotating the substrate.